

[0091] *What is claimed is:*

Claims

1. An apparatus for conditioning a polishing pad of a CMP apparatus for making semiconductor wafers, comprising:

a control arm configured to extend at least partially over the polishing pad;

and

at least one cylindrical conditioning piece coupled to the control arm, the control arm configured to apply the at least one cylindrical conditioning piece to the polishing pad.
2. An apparatus for conditioning a polishing pad as recited in claim 1, wherein the control arm extends over at least a radius of the polishing pad.
3. An apparatus for conditioning a polishing pad as recited in claim 1, wherein the apparatus further comprises a polishing pad holder that is configured to hold and rotate the polishing pad at a constant or variable velocity.
4. An apparatus for conditioning a polishing pad as recited in claim 3, wherein the control arm is coupled to a pivot about a fixed point adjacent the polishing pad holder.

5. An apparatus for conditioning a polishing pad as recited in claim 1, wherein a length of the at least one cylindrical conditioning piece is configured to be smaller than a radius of a polishing pad holder.

6. An apparatus for conditioning a polishing pad as recited in claim 1, wherein the control arm is configured to linearly translate the at least one cylindrical conditioning piece along a length of the control arm while in contact with the polishing pad coupled to a polishing pad holder, and configured to position the at least one cylindrical conditioning piece at predetermined locations on a polishing pad surface along the radius of the polishing pad.

7. An apparatus for conditioning a polishing pad as recited in claim 1, wherein the at least one conditioning piece is configured to be inflatable by an outward pressure from an internal portion of the cylindrical conditioning piece to vary conditioning pressure on the polishing pad.

8. An apparatus for conditioning a polishing pad as recited in claim 7, wherein the control arm is configured to position the at least one conditioning piece into close proximity of a surface of the polishing pad, the at least one conditioning piece being capable of contacting the surface of the polishing pad when the at least one conditioning piece is inflated.

9. An apparatus for conditioning a polishing pad as recited in claim 7, wherein the outward pressure may be applied by one of a fluid pressure and mechanical pressure.

10. An apparatus for conditioning a polishing pad as recited in claim 1, wherein the control arm is configured to rotate the at least one conditioning piece about a longitudinal axis.

11. An apparatus for conditioning a polishing pad as recited in claim 1, wherein the control arm is configured to position the at least one conditioning piece into contact with a surface of the polishing pad.

12. A method for conditioning a polishing pad surface of a polishing pad of a CMP apparatus for making semiconductor wafer, comprising:
providing a cylindrical conditioning piece to the CMP apparatus;
rotating the cylindrical conditioning piece about a longitudinal axis of the cylindrical conditioning piece; and
applying the rotating cylindrical polishing pad to the polishing pad surface.

13. A method for conditioning a polishing pad surface as recited in claim 12, wherein the method further comprises attaching the cylindrical conditioning

piece to a control arm, and extending the control arm over at least a portion of a polishing pad surface.

14. A method for conditioning a polishing pad surface as recited in claim 13, wherein the method further comprises extending the control arm over at least a radius of a polishing pad in a plane that is substantially parallel to the polishing pad holder.

15. A method for conditioning a polishing pad surface as recited in claim 13, further comprising:

angling the control arm with a pivot about a fixed point adjacent the polishing pad.

16. A method for conditioning a polishing pad surface as recited in claim 15, wherein adjusting the rotational velocity of the conditioning piece includes adjusting a control arm pivot position and a pivot velocity.

17. A method for conditioning a polishing pad surface as recited in claim 12, wherein rotating the conditioning piece includes adjusting a rotational velocity of the conditioning piece to maintain a consistent differential velocity between the rotational velocity of the conditioning piece and a rotational velocity of the polishing pad from a center of the polishing pad to an edge of the polishing pad.

18. A method for conditioning a polishing pad surface as recited in claim 12, further comprising:

varying a conditioning rate by adjusting at least one of an inflation level of the conditioning piece, a rotational velocity of the conditioning piece, a rotational velocity of the rotation of the polishing pad, and a conditioning piece downward force applied to the polishing pad.

19. A system for conditioning a polishing pad, comprising:

a polishing pad holder;

a polishing pad coupled to the polishing pad holder;

an arm; and

a cylindrical conditioning piece coupled to the arm, the arm being configured to apply the cylindrical conditioning piece to the polishing pad.

20. A system for conditioning a polishing pad as recited in claim 19, wherein the arm is capable of extending to at least a radius of the polishing pad.

21. A system for conditioning a polishing pad as recited in claim 19, wherein the arm is configured to rotate the cylindrical conditioning piece.

22. A system for conditioning a polishing pad as recited in claim 19, wherein the polishing pad holder is a platen configured to rotate the polishing pad.

23. A system for conditioning a polishing pad as recited in claim 19,
further comprising,

a slurry bar configured to dispense slurry during chemical mechanical
planarization.

24. A system for conditioning a polishing pad as recited in claim 23,
wherein the slurry bar includes a plurality of outputs, each of the plurality of outputs
being capable of outputting different amounts of fluid.